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09/884,644	06/19/2001	Laurent Guiziou	SP00-131	2645

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EXAMINER
KIM, RICHARD H

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/884,644	Applicant(s) GUIZIOU, LAURENT	
	Examiner Richard H Kim	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claims 1, 15, 21, 22, 24 and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Kuroyanagi et al. (US 6,154,583).

Referring to claim 1, Kuroyanagi et al. discloses an optical device comprising a first row of M optical circuit stages (see Fig. 5, ref. 1), each of the M optical circuit stages being connected to an adjacent optical circuit stage by N parallel waveguides having substantially no curvature (see Fig. 5, ref. 1, 8, 57, 64); and a second row of M optical circuit stages (see Fig. 5, ref. 8), each of the M optical circuit stages being connected to an adjacent optical circuit stage by N parallel waveguides having substantially no curvature (see Fig. 5, ref. 57, 65), wherein the first row is coupled to the second row to form a multi-stage planar device (see Fig. 5, 2nd stage), and N and M are integers (see Fig. 5).

Referring to claim 15, Kuroyanagi et al. and Madsen et al. disclose the device previously recited. Kuroyanagi et al. further discloses the first row is connected to the second robw by a chip-to-chip connection (see Fig. 5, ref. 2nd stage).

Referring to claim 21, Kuroyanagi et al. discloses a method for making an optical device comprising the steps of providing a planar device having a plurality of rows (see. Fig. 5, ref. 1,8), each of the plurality of rows having M optical circuit stages (see Fig. 5, ref. 1st-3rd stage), each of the M optical circuit stages being connected to an adjacent optical circuit stage by N parallel waveguides having substantially no curvature (see Fig. 5, ref. 1, 8), wherein N and M are integers; separating the planar device into a plurality of discrete components, wherein each discrete component includes a row of plurality of rows (see Fig. 5); and coupling the plurality of discrete components to from a multi-stage planar device (see Fig. 5).

Referring to claim 22, Kuroyanagi et al. discloses an optical device wherein the step of providing includes providing each component with N input waveguide and N output waveguides (see Fig. 5, ref. 1, 8).

Referring to claim 24, Kuroyanagi et al. discloses a device wherein the step of coupling includes connecting the N output waveguides of a discrete component to the N input waveguide of an adjacent discrete component using a chip-to-chip connection (see Fig. 5, 2nd stage).

Referring to claim 28, Kuroyanagi et al. discloses that the planar device is an NXN switch fabric (see col. 9, lines 53-55).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 2, 3, 14 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroyanagi et al. (6,154,583) in view Madsen et al. (US 6,253,000 B1).

Referring to claim 2, Kuroyanagi discloses the device previously recited. The reference further disclose the device wherein each of the M optical circuit stages includes circuit units to form an N X N multistage planar device (see col. 7, lines 55-57). However, the reference does not disclose the device wherein the optical circuit stages include N-optical circuit units.

Madsen et al. discloses a device wherein a device wherein the M optical circuit stages includes N-optical circuit units (see Fig. 9, ref. 91).

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the M optical circuit stages to include N-optical circuit units since one would be motivated to simplify the device by allowing the same optical switching device to be used at each stage, thereby reducing the amount of different components needed for the device.

Referring to claim 3, Kuroyanagi et al. and Madsen et al. disclose the device previously recited. Kuroyanagi et al. further discloses an optical device wherein the optical circuit unit includes a switching device (see col. 9, lines 18-21).

Referring to claims 14, Kuroyanagi et al. and Madsen et al. disclose the device previously recited. Kuroyanagi et al. further disclose a device wherein the first row is connected to the second row (see Fig. 5, ref. 2nd stage). However, the reference does not disclose the device the first row and the second row are connected by optical fibers.

Madsen et al. discloses a device wherein the optical connections are made by optical fibers (see col. 12, lines 28-29).

It would have been obvious to one having ordinary skill in the art to use optical fibers for connections since one would be motivated to provide a secure connection between the optical devices, thereby reducing coupling loss due to scattering of light.

Referring to claim 23, Kuroyanagi et al. discloses a device wherein the step of coupling includes connecting the N output waveguides of a discrete component to the N input waveguides of an adjacent discrete component (see Fig. 5). However, the reference does not disclose the device wherein the step of coupling includes connecting with optical fiber.

Madsen et al. discloses a device wherein coupling includes connecting with optical fiber (see col. 12, lines 28-29).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the coupling include connecting with optical fiber since one would be motivated to reduce the risk of coupling loss due to scattering since optical fiber transmits the signal within an enclosed means.

3. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroyanagi et al. and Madsen et al., further in view of Lagali et al. (US 6,292,597 B1).

Kuroyanagi et al. and Madsen et al. disclose the device previously recited. However, the references do not disclose the device wherein the switching device includes a Mach-Zehnder switching device, directional coupler or Y-digital switch.

Lagali et al. discloses a device wherein the switching device includes a Mach-Zehdner switching device (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the switching device include a Mach-Zehnder switching device or Y-digital coupler since one would be motivated to switch, and the general function of the optical device is independent of the type of switching device used. Further, neither one of the listed switching device provides a significant advantage over the other, and as a result, one of ordinary skill in the art can use either switching devices to provide a switching means for the intended use of the optical device.

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroyanagi et al. and Madsen et al., further in view of Plastow (US 5,289,55).

Kuroyanagi et al. and Madsen et al. discloses the device previously recited. However, the references do not disclose the optical circuit unit includes a directional coupler.

Plastow discloses an optical circuit unit including a directional coupler (see Fig. 3, ref. 18).

It would have been obvious to one having ordinary skill in the art at the time the invention was for the optical device to include a directional coupler since one would be motivated to maximize the power of the signal and reduce the required amplification. According

to Plastow, "the required sample optical signal can be obtained from one arm by simply inverting the detected optical signal, without reducing the amplitude of the output signal in the other arm. This gives a sample signal as large as the output signal (see Fig. 6, lines 19-25).

5. Claims 7-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroyanagi et al. (US 6,154,583) and Madsen et al., further in view of Edwards et al. (US 6,404,9432 B1).

Referring to claim 7, Kuroyanagi et al and Madsen et al. disclose the device previously recited. However, the references do not disclose the device wherein the optical circuit unit includes a MEMS device.

Edwards et al. discloses a device wherein an optical circuit unit includes a MEMS device (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the optical circuit unit to include a MEMS device since one would be motivated to maximize the accuracy of the device. According to Edwards et al., using a MEMS device reduces cross talk because the waveguides are physically isolated from one another and coupling cannot occur" (see col. 1, lines 35-42).

Referring to claims 8-13, Kuroyanagi et al and Madsen et al. disclose the device previously recited. However, the references do not disclose the device wherein the optical circuit unit includes a thermo-optical actuator, a mechanical actuator, an electro-optical actuator, an electrostatic actuator or a magnetic actuator.

Edwards et al. discloses a device wherein an optical circuit unit includes an electro-optic actuator and a thermo-optic actuator (see col. 1, lines 33-34).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the device wherein the optical circuit unit includes a thermo-optical actuator, a mechanical actuator, an electro-optical actuator, a electrostatic actuator or a magnetic actuator, since one would be motivated to actuate the switch and the function of the device is independent of the type of actuating mechanism. Further, either actuating mechanisms listed may be used for the intended purpose of the optical device, since neither one of the actuating mechanism provides a significant advantage over the other.

6. Claims 16-17, 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroyanagi et al. and Madsen et al, further in view of Douglass (US 5,786,979).

Kuroyanagi et al. and Madsen et al. disclose the device previously recited. However, the references do not disclose the chip-to-chip connection includes a laser weld or an adhesive; and the steps of coupling includes connecting the N output waveguides of a discrete components to the N input waveguides of an adjacent discrete components by laser welding or using an adhesive.

Douglass discloses a device wherein an optical device to optical device connection includes an adhesive (see col. 5, lines 39-40).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the chip-to-chip connection include an adhesive or laser welding; or the steps of coupling includes connecting the N output waveguides of a discrete components to the N input waveguides of an adjacent discrete components by laser welding or using an adhesive since one would be motivated to increase the durability of the device by providing a

secure bond between the optical components to prevent accidental detachment. Further, using either a laser weld or adhesive would be obvious since neither one of the actuating mechanisms provides a significant advantage over the other, and using either one maintains the primary purpose of the device.

7. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroyanagi et al. and Madsen et al., further in view of Dannoux et al. (US 5,447,585).

Kuroyanagi et al. and Madsen et al. discloses the device previously recited. However, the references do not disclose that the chip-to-chip connection is implemented using a mass pigtailing technique.

Dannoux et al. discloses a mass pigtailing technique (see abstract).

It would have been obvious to one having ordinary skill in the art to implement a mass pigtailing technique in the chip-to-chip connection since one would be motivated to facilitate optical connections between the chips. By providing mass pig-tailing techniques between the chips, a secure connection between chips can be made while reducing coupling loss since the optical signal will be confined to an optical fiber.

8. Claims 19, 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroyanagi et al. and Madsen et al., further in view of Graves (US 6,366,716 B1).

Referring to claim 19, Kuroyanagi et al. and Madsen et al. disclose the device previously recited. Kuroyanagi et al. further discloses the optical circuit unit is disposed on a substrate (see

Fig. 9a, ref. 62). However, the references do not disclose the chip-to-chip connection includes aligning and mounting the first row and second row on an alignment substrate.

Graves et al. discloses a device wherein the optical components are disposed on an alignment substrate (see col. 3, lines 44-49).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the chip-to-chip connection include aligning and mounting the first row and second row on an alignment substrate since one would be motivated to increase the ease of aligning the optical components with one another, thereby adding precision to the device. According to Graves et al. "Implementing the optical switching devices as monolithic structures on silicon wafers allows alignment features to be provided such that components of the device can be positioned and interconnected within required tolerances" (see col. 3, lines 44-49).

Referring to claims 20 and 27, Kuroyanagi et al. and Madsen et al. disclose the device previously recited. However, the references do not disclose the device wherein an index-matching material is disposed between the first and second rows or adjacent discrete components.

Graves et al. discloses a device wherein an index-matching material is disposed between optical components (see col. 14, line 20).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have an index-matching material disposed between the first and second rows or discrete adjacent components in order to reduce coupling loss between the first and second row. According to Graves et al., such a modification would provide a continuous optical

path therethrough, thereby preventing coupling loss due to discontinuity within the path that could arise due to variations of the refractive index.

9. Claims 29-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroyanagi et al., in view of Graves.

Referring to claim 29, Kuroyanagi et al. discloses a method comprising the steps of disposing a matrix of optical circuit stages being connected to an adjacent optical circuit stage by N parallel waveguides extending in a first direction to form at least one row of M optical circuit stages, wherein the parallel waveguides have substantially no curvature, and N and M are integers (see Fig. 5). However, the reference does not disclose that the method comprises the step of providing a substrate.

Graves et al. discloses a device wherein the optical matrix is disposed on an alignment silicon substrate (see col. 3, lines 44-49).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the matrix of optical circuit stages on a substrate since one would be motivated to increase the ease of aligning the optical components with one another, thereby adding precision to the device. According to Graves et al. "Implementing the optical switching devices as monolithic structures on silicon wafers allows alignment features to be provided such that components of the device can be positioned and interconnected within required tolerances" (see col. 3, lines 44-49).

Referring to claim 30, Kuroyanagi et al. and Graves et al. disclose a method previously recited. Kuroyanagi et al. further discloses a method comprising the steps of separating the at

least one row of M optical circuit stages into a plurality of optical circuit components; and coupling the plurality of optical circuit components to form a multistage planar device (see Fig. 5).

Referring to claim 31-35, Kuroyanagi et al. and Graves et al. disclose the method previously recited. However, the references do not disclose the method wherein the substrate comprises of silicon, silica, silica material, polymer material or semiconductor material.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the substrate made of silicon, silica, polymer material or semiconductor material since it has been held to be within the general skill of a worker in the art to select a known material on the basis of suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416. Further, one of ordinary skill in the art may choose any of the above listed material since one does not provide a significant advantage over the other, and either may be used for the optical device.

Referring to claim 36, Kuroyanagi and Graves disclose the device previously recited. However, the references do not disclose that the approximate surface area of the substrate is 100mm X 100mm.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the surface area of the substrate to be approximately 100mm X 100mm since one would be motivated to provide a sufficient amount of surface area to accommodate the optical components without significantly decreasing the speed of the device. Further, it has been held that where the general conditions of a claim are disclosed in the prior

art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller, 105 USPQ 233.*

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard H Kim whose telephone number is (703)305-4791. The examiner can normally be reached on 8:30-5:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H Kim can be reached on (703)305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Richard H Kim
Examiner
Art Unit 2882

RHK
September 27, 2002

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